

CLAIMS

What is claimed is:

- 5 1. A method for conveying bidirectional data over a transformer comprising the steps of:
modulating an alternating current signal with outbound data;
driving a first side of the transformer with the modulated signal;
receiving the modulated signal from a second side of the transformer;
extracting outbound data from the received modulated signal;
10 modulating according to inbound data the load presented to the second side of the
transformer when the alternating current signal is not modulated; and
receiving inbound data by sensing said load modulation.
2. The method of Claim 1 wherein modulating the alternating current signal with outbound
15 data comprises switching the phase of an alternating current signal according to a serial
bit stream coincident with a clock.
3. The method of Claim 1 wherein extracting outbound data comprises:
extracting a clock signal from the received modulated signal; and
20 sampling the received modulated signal according to the extracted clock signal.
4. The method of Claim 3 wherein extracting a clock signal comprises:
sensing transitions in the received modulated signal;
generating an independent clock signal; and
25 synchronizing the independent clock with the transitions.
5. The method of Claim 1 wherein modulating the load presented to the second side of the
transformer comprises:
varying the impedance presented to the transformer according to a serial data stream
30 coincident with an extracted clock signal.

6. The method of Claim 1 further comprising:

generating an analog signal according to the extracted outbound data signal; and
varying the impedance of a circuit load according to the analog signal.

7. The method of Claim 1 wherein modulating the load presented to the second side of the transformer comprises:

generating a digital value according to the voltage across a circuit load coincident with an extracted clock signal; and
varying the impedance presented to the second side of the transformer according to the digital value.

8. An apparatus for conveying bidirectional data across a galvanic barrier comprising:

signal generator;
signal modulator capable of modulating with outbound data a signal produced by the signal generator;
transformer having a first side capable of receiving a modulated signal from the signal modulator and a second side;
data extractor capable of extracting outbound data from a modulated signal received from the second side of the transformer;
transformer load modulator capable of modulating the load on the second side of the transformer according to inbound data; and
inbound data recovery unit capable of determining inbound data by sensing load modulations induced by the transformer load modulator.

9. The apparatus of Claim 8 wherein the signal modulator comprises a phase modulator capable of altering the phase of the signal coincident with a clock.

10. The apparatus of Claim 8 wherein the data extractor comprises:

clock extractor capable of extracting a clock from a received modulated signal; and
sampling device capable of sampling the received modulated signal according to the extracted clock.

11. The apparatus of Claim 10 wherein the clock extractor comprises:

controllable oscillator capable of generating a clock according to a control signal; and
comparator capable of generating the control signal by comparing transitions in a
received modulated signal with transitions in the generated clock.

12. The apparatus of Claim 8 wherein the transformer load modulator comprises:

impedance element;
synchronizer capable of synchronizing inbound data with an extracted clock signal;
and
switch capable of attaching the impedance element to the second side of the
transformer according to the synchronized inbound data.

13. The apparatus of Claim 8 further comprising:

digital-to-analog converter capable of generating an analog signal according to
extracted outbound data;
line circuit load capable of presenting a load to a communications channel;
impedance element; and
analog gate capable of linearly imparting the impedance element across the line
circuit load according to the analog signal.

14. The apparatus of Claim 8 further comprising:

line circuit load capable of presenting a load to a communications channel;
analog-to-digital converter capable of generating a digital value according the voltage
present across the line circuit load;
impedance element; and
switch capable of attaching the impedance element to the second side of the
transformer according to the digital value.

15. A system-side isolation controller comprising:

signal generator;

signal modulator capable of modulating a signal produced by the signal generator; and
inbound data recovery unit capable of determining inbound data by sensing load
modulations exhibited by a transformer.

- 5 16. The system-side isolation controller of Claim 15 further comprising a transformer driver
capable of driving the transformer with the modulated signal.

17. A line-side isolation controller comprising:

- 10 data extractor capable of extracting outbound data from a modulated signal received
from a second side of a transformer; and
transformer load modulator capable of modulating the load presented to the second
side of the transformer according to inbound data.

18. The line-side isolation controller of Claim 17 wherein the data extractor comprises:

- 15 clock extractor capable of extracting a clock signal from a received modulated signal;
and
sampling device capable of sampling the received modulated signal according to the
extracted clock signal.

20 19. The line-side isolation controller of Claim 18 wherein the clock extractor comprises:

- controllable oscillator capable of generating a clock according to a control signal; and
comparator capable of generating the control signal by comparing transitions in a
received modulated signal with transitions in the generated clock.

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20. The line-side isolation controller of Claim 17 further comprising:

- digital-to-analog converter capable of generating an analog signal according to
extracted outbound data;
analog gate capable of linearly imparting a first impedance element across a line
30 circuit load according to the analog signal;

analog-to-digital converter capable of generating a digital value according the voltage
present across the line circuit load;
impedance element; and
switch capable of attaching a second impedance element the second side of the
transformer according to the digital value.

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